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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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09/365,349 07/30/99 TERRY

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EXAMINER

IBRAHIM, M

ART UNIT

PAPER NUMBER

1649

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DATE MAILED: 10/08/99

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.
09/365,349

Applicant(s)
Terry et al

Examiner
Medina A. Ibrahim

Group Art Unit
1649



☒ Responsive to communication(s) filed on Jul 30, 1999

☐ This action is **FINAL**.

☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire 3 month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

Disposition of Claims

☒ Claim(s) 1-19 is/are pending in the application.

Of the above, claim(s) _____ is/are withdrawn from consideration.

☐ Claim(s) _____ is/are allowed.

☒ Claim(s) 1-19 is/are rejected.

☐ Claim(s) _____ is/are objected to.

☐ Claims _____ are subject to restriction or election requirement.

Application Papers

☐ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

☐ The proposed drawing correction, filed on _____ is ☐ approved ☐ disapproved.

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

☐ All ☐ Some* ☐ None of the CERTIFIED copies of the priority documents have been
☐ received.

☐ received in Application No. (Series Code/Serial Number) _____.

☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

*Certified copies not received: _____

☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

☒ Notice of References Cited, PTO-892

☐ Information Disclosure Statement(s), PTO-1449, Paper No(s). _____

☐ Interview Summary, PTO-413

☐ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Notice of Informal Patent Application, PTO-152

--- SEE OFFICE ACTION ON THE FOLLOWING PAGES ---

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DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 5-6, 8-13, and 15-19 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 5-6, 9-11 are rejected under 35 USC 112, second paragraph, as being indefinite for failing to employ proper Markush terminology. See MPEP 2173.05(h). An insertion of ---the group consisting of--- after "selected from" in each of these claims would obviate the rejection.

Claims 8-12 are indefinite in their recitation of the phrase "unengineered" as it is unclear whether the plant is genetically engineered or non-genetically engineered. Amendment to the claims by replacing the word "unengineered" with---untransformed---, would obviate the rejection, if basis for the term can be found in the specification. Dependent claims 15-17 are included in the rejection

Claims 13, 18, and dependent claim 19 are indefinite because claims 13 and 18 are duplicates.

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Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

4. Claims 1-2, 5-8, 13-15, and 18-19 are rejected under 35 U.S.C. 102(b) as being anticipated by Arisi et al.

Claims are drawn to a plant transformed with a gene encoding an overexpressed glutamylcysteine synthase under the control of a heterologous promoter, wherein the glutamylcysteine synthase provides an enhanced accumulation of heavy metals.

Arisi et al teach poplars (hybrid from *Populus tremula* x *P. alba*) transformed with a gene encoding a gamma-glutamylcysteine synthase under the control of an enhanced CaMV 35 S promoter (see, e.g., page 365, Results), wherein the strong promoter would lead to high levels of gene expression, and wherein heavy metal accumulation would be inherent (see,e.g., page 371, last paragraph).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are

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such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Raskin et al in view of Watanabe et al, and further in view of Chen et al.

Claims are drawn to *Brassica juncea* transformed with a gene encoding a glutamylcysteine synthase, wherein the gene is overexpressed under the control of a heterologous promoter, and wherein the overexpressed glutamylcysteine synthase confers at least 50 % greater enhanced accumulation of cadmium, uranium, molybdenum, chromium and mercury heavy metals than non-transformed plant. Claims are also drawn to a method of decreasing heavy metal content of a soil containing an excessive amount of the said heavy metals by growing a transgenic *Brassica juncea* in the stressed soil.

Raskin et al teach a method for removing heavy metals from soil contaminated with heavy metals for example, mercury, cadmium, cobalt, nickel, molybdenum, chromium, copper, arsenic,

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selenium, zinc, antimony, beryllium, gold, barium, manganese, silver, thallium, tin, rubidium, etc, by growing a Brassica juncea plant capable of accumulating the said metals from soil (see, e.g, summary on column 1), and have shown an accumulation of 30- 1000-fold above levels present in the soil (see, e.g., column 5). Raskin et al also teach Brassica juncea lines transformed with Monkey MT cDNAs for their ability to accumulate chromium and lead from excessively contaminated soil (see, e.g., example 4), but do not teach a gene encoding glutamylcysteine synthase.

Watanabe et al teach an isolated and sequenced gsh I gene for gamma-glutamylcysteine synthase from E. coli (see, e.g, pages 4395-4396).

Chen et al teach cadmium tolerance of tomato cells due to an increased activity of gamma-glutamylcysteine synthase under cadmium stress (see,e.g, page 233, Abstract).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize the transformed Brassica juncea plant and the method for phytoremediation of metals taught by Raskin et al and to modify that method by incorporating the gene encoding glutamylcysteine synthase taught by Watanabe et al to produce a transgenic Brassica juncea overexpressing glutamylcysteine synthase as suggested by Chen et al, wherein the transgenic Brassica juncea is capable of heavy metal accumulation from a contaminated soil. An overexpression of glutamylcysteine synthase appears to enhance plants tolerance against heavy metal toxicity, including tungsten, tellurium and polonium.

No claim is allowed.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Medina A. Ibrahim whose telephone number is (703) 306-5822. The examiner can normally be reached on Monday through Friday from 8:30AM to 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lynette Smith, can be reached on (703) 308-3909. The fax phone number for the organization where this application or proceeding is assigned is (703) 305-7401.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0196.

September 30, 1999
mai

DAVID T. FOX
PRIMARY EXAMINER
GROUP ~~129~~ 1649

David T. Fox